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AUTHOR Boegh, Jorgen; Krebs, Allan M.; Petersen, Lars O.; Wagner, M.

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ABSTRACT

This paper describes a tele-educational environment and reports on experiences obtained during international trials. The tele-educational environment is built around the metaphor of a college. The virtual college offers the opportunity for students to participate in desktop tele-education from their homes or offices. The environment is based on Internet technology, and the user interface is a common World Wide Web browser. Students navigate through the virtual college by entering classrooms, group rooms, studies, and teacher offices. During breaks, students can visit a virtual tea room. The rooms are furnished with different tools according to the needs for each particular room. The feedback from experimenting with the virtual college in an international setting has been encouraging. The concept was well accepted by the students. They quickly become familiar with the environment, the learning effect was good, and they appreciated the attempts to introduce social ingredients into this virtual environment. One figure presents the user interface to the virtual college. (Author/AEF)

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A Web based Virtual College

Jørgen Bøegh, Allan M. Krebs, Lars Ø. Petersen, M. Wagner
DELTA Danish Electronics, Light & Acoustics
Venlighedsvej 4
DK-2970 Hørsholm
Denmark
Tel: + 45 45 86 77 22
Fax: + 45 45 86 58 98
e-mail: jb@delta.dk

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Abstract: The need for tele-education is rapidly growing. This paper describes a tele-educational environment and reports on experiences obtained during international trials. The tele-educational environment is build around the metaphor of a college. The virtual college offers the opportunity for students to participate in desktop tele-education from their homes or offices. The environment is based on Internet technology and the user interface is a common Web browser. Students navigate through the virtual college by entering classrooms, group rooms, studies, and teacher offices. During breaks students can visit a virtual tea room.

Keywords: Group work, lectures, self study, tele-education, virtual college.

1. The Virtual College

Tele-education will play an increasingly important role in the future. The need for education is rapidly growing due to the rapid changes in society. New technology is introduced with an astonishing speed never seen before. This makes vocational education at least as important as basic school education. Education will be a life long activity, and social and economic welfare will be linked with education. This is true for both individuals and countries.

The propagation of the Internet now makes tele-education based on Internet technology possible in most places. Hereby is introduced a means to make life long education achievable in an efficient way. In particular the Internet supports "desktop tele-education". This concept means that individual students participate in tele-educational courses from their offices or homes using a desktop computer online connected to a course provider. What is needed is a multimedia PC, a headset and an Internet connection.

The tele-educational environment described in this paper is developed with "desktop tele-education" in mind.

It is very important that a tele-educational environment is easy to use. The environment itself should constitute a minimum learning threshold for the students. This goal has been achieved in two ways. First of all, the main user interface is a common web-browser. This means that everybody familiar with the Internet will be familiar with the interface of the tele-educational environment. Secondly, the environment is build around the metaphor of a college. This means that the user interface looks like a real college with different rooms for different purposes. The students will find a classroom for lectures, a group-room for group-work, a study for self-study work, a teacher's office, and a tea-room

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for social interaction. The different rooms make it easy and intuitive to navigate in the educational environment.

The virtual college applies different modes of teaching and learning. This includes synchronous modes like on-line lectures and group exercises as well as asynchronous modes like interactive self-study, participation in threaded billboard conferences and sharing of documents.

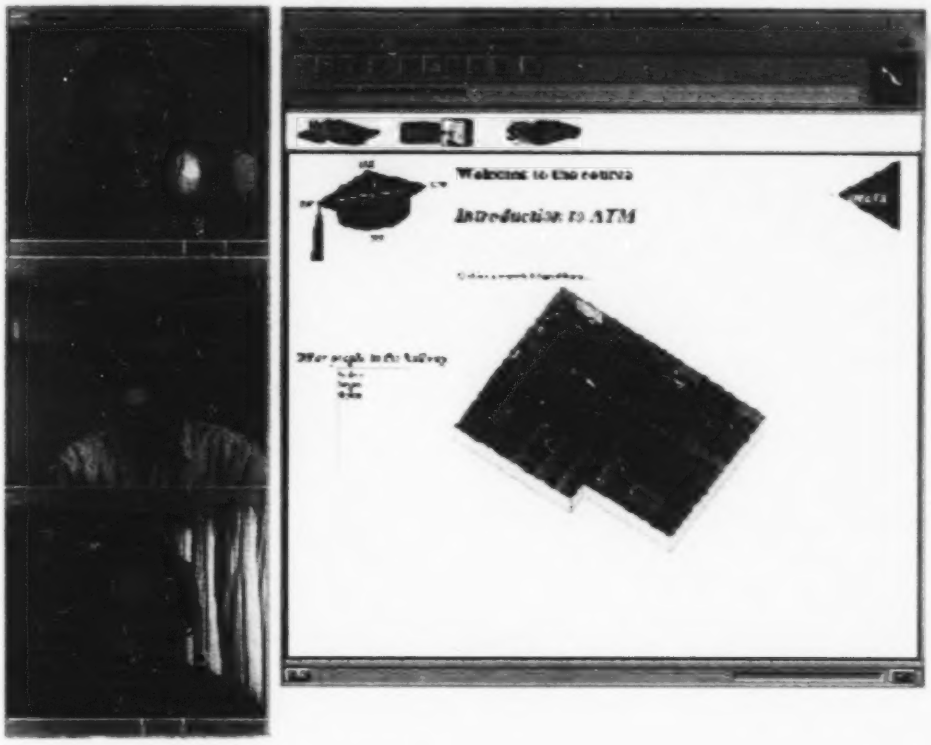

Figure 1 - The user interface to the virtual college

A challenge in designing the tele-educational environment has been to integrate these modes of education and to combine them with the metaphor of the college. This integration has resulted in a tele-educational environment, which is intuitive and easy to understand for both students and teachers.

The virtual college is based on Internet technology. The present implementation of the virtual college uses the Netscape Web-browser, extended with loosely integrated audio and video tools. It is an obvious advantage to base the virtual college on this well-known industry standard, which makes it immediately accessible to everybody familiar with Web-browsing.

The virtual college is highly scalable. This means that it can be adjusted to the actual needs and existing infrastructure, in particular to the available communication bandwidth. Although it was developed with broadband communication in mind, the virtual college can be scaled down to an Internet environment by carefully restricting the usage of audio and video conferencing facilities. A more detailed description of the tele-educational system in a broadband telecommunication environment can be found in [1].

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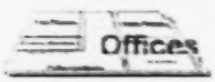
2. The Rooms

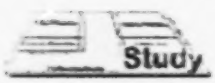
The virtual college looks like the plan of a "real" college. There are different rooms each serving a specific purpose. The design of the virtual college is modular. This makes it easy to furnish the rooms according to their intended usage. The furniture consist in tools like audio and video conferencing, a shared white board, a slide presentation tool, etc.

In addition a first version of a floor control system has been included in the environment. It enables the teacher to control who is able to speak thereby making the communication more disciplined. Students can add themselves to a list of speakers, e.g. for making questions. This list is part of the floor control system.

The classroom is the place for on-line lectures and presentations. This implies that students must be "present" in the class room during lectures. The class room can be furnished with an audio tool and depending on communication facilities also with video conferencing facilities. There will be a whiteboard to allow the teacher to write and draw, and a slide presenter for the teacher to show educational material. It is also possible to show any page from the Web on this slide projector.



The office is available for the teacher and is furnished with course administration tools. For example this could be tools for making new self-study material available for students during a course. The office can also be used for private consultation for students. In this case audio and video conferencing tools could naturally be part of the room as well as a shared note pad.



The study is the student's office. Here the student will find self-study material, exercises, slides from previous lectures, supplementary material (like in a library) and links to other sites on the Web. The self-study material is made highly interactive with animations, self tests, indexes and bookmarks. This room is for the asynchronous mode of education and the student can work here at any time. There is no interaction with teachers and other students in the study room.

The group rooms are furnished for small groups of students to meet and work together on exercises and to do group works. This requires audio and preferably also video conferencing facilities, shared cooperative tools like a note pad and whiteboard, and of course the relevant group exercise.

The tea room is supposed to be used for informal chat and social contact with fellow students during breaks. The tea room is furnished with a number of tables where students can sit and have a virtual "cup of tea". Each table has its own audio and video conferencing facility.

The information poster in the hallway gives all the administrative information about the course. This includes timetables and descriptions of lectures, group work and self study modules. Descriptions and pictures of all teachers and students participating in the course can also be found here.

The billboard contains different threaded conferences, each related to a particular topic. These conferences are related to the topic of the course and students are expected to make contributions as part of the education. The teacher will regularly monitor the billboard.

3. The tools

Each of the room in the virtual college is furnished with different tools according to the needs for a particular room.

- The shared whiteboard has the basic functionality for drawing and writing. It can be used with a background image. This is useful for group exercises where students discuss a diagram and during lectures where the teacher can draw on a slide.

- The shared notepad is related to the whiteboard. It is used for shared working on small text documents. The notepad has the basic text editing functionality needed for collaborative work on text, however the functionality is limited compared with professional text editors.

- The slide presentation tools primarily used in the class room. It allows the teacher to show slides and students to view these slides. The whiteboard can be included on slides. This allows the teacher to add notes on slides during presentations.

- The shared bullet tool is closely related to the slide presentation tool. The teacher can use this facility to put the attention of the students to specific points on a slide.

- The audio and video control starts and stops conferences. It includes functionality for muting and un-muting audio and video. This control is partly integrated in the floor control system.

- The message tool is used for sending and receiving small messages between persons present in the virtual college.

- The other users is a tool that shows who is also present in a room. By clicking the name of a person the personal data of that person will appear.

The virtual college and accompanying tools are implemented in Java, which makes it platform independent. The rapid development of Internet technology has made it a challenge to comply with the latest releases of Java and Web-browsers.

4. The Trials

The virtual college has been used in different trials during the last year and further trials are planned in the near future. The first trials were run in a local area network environment in order easily to monitor and control the students and the technology. Two major pan-European trials were conducted recently. The trials included about 40 students and 2 teachers located at 6 sites in four countries: Denmark, England, Germany and Ireland. The JAMES (Joint ATM Experiment on European Services) broadband network connected the sites during the experiments.

The topic of the course was "An Introduction to ATM". The students were partly recruited from industry and partly from academia. They were not required to have any specific qualifications related to the topic of the course. Each course was run over 4 days and consisted of 4 class room lectures, 3 self-study modules with exercises, 3 group exercises, and one class room discussion.

This very tight schedule was made for practical reasons such as network availability. To some extent it hampered the experiments. In a real application of the system the course should have run over at least two to three weeks and less activity each day.

5. The Experiences

The trials have been carefully monitored and evaluated. After each trial parts of the system was updated based on experiences gained. The main conclusions were that the users liked the virtual college. They found the college metaphor easy to understand. They had no problems navigating through the virtual college. Another result was that the two modes of teaching complemented each other very well.

Generally on-line teaching and group work seem to be a motivating way of learning. But it also appeared to be very demanding for the students to follow a course in this environment. This is because the student's attention is concentrated on the computer screen and the audio input received. Students simply get tired and loose attention. For this reason lectures must be relatively short, not more than half an hour. Also the total course activity each day must be limited.

Students are positive about the class room form of teaching. However, all students are not equally prepared to ask questions. Some students never ask questions in this environment, others quickly become heavily engaged in discussions and trying out the boundaries of the media. Generally students find it easier to ask questions here than in an auditorium. On the other hand it is more difficult than in a classroom. In other words, the "communication distance" between student and teacher is perceived smaller than in an auditorium but still bigger than in a "real" classroom.

Experiences from the group exercises showed that students might have difficulties in initiating and performing efficient group work. Some students seemed alienated towards the environment and made no attempts to get engaged in the group work. Other students worked very well in this environment, so no definitive conclusion could be made.

The billboards are easy to accept and to use. However, it is necessary to engage the students to really using these facilities, e.g. by giving them specific assignments. During the trial some very interesting discussions took place, but only few students participated. This might be due to the tight schedule of the course.

The teachers require some new skills in the virtual college. For examples must the teacher be able to coach the students into using the media. Also in case of technical problems the teacher must be able to help.

It is well known that it is very time consuming and hence very expensive to develop the self-study material. The experience is that with high quality material the students are satisfied and the learning effect is good. The combination of self-study material and online lectures and group exercises seems to be a cost-effective way to conduct tele-education.

6. Conclusion

The feedback from experimenting with the virtual college in an international setting has been encouraging. The concept was well accepted by the students. They quickly became familiar with the environment, the learning effect was good and they appreciated the attempts to introduce some social ingredients into this virtual environment.

References

[1] M. Riordan, V. Wade, A. M. Krebs, J. Boegh, M. Wagner: *Tele-Educational Services in a Future Open Service Market*, in Proc. of ED-MEDIA & ED-TELECOM 97, Calgary, Canada, 1997.

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